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**Research Paper**

# On the problem of terminology selection for EOP teaching

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***Abstract.*** Terminology is a pivotal element in acquisition and perfection of the science and technology language competence. For the EOP teachers and learners, it is extremely critical to present, perceive and assimilate systemic terms correctly and use them fluently in the professional discourse so as to grasp and assimilate the course contents properly. On the basis of exhaustive examples from the field of "Ship construction" and "Marine Power Plants" professional discourse, the technique of terminology selection, description and study was demonstrated. The traditional approaches to terminology system analysis, such as morphological, syntactic, and semantic ones have been applied. The completeness of the study would be insufficient without the use of such powerful instrument of research as a cognitive analysis. Its efficiency is demonstrated in the article on the basis of terminology classification description. The applicability of the results obtained was considered in the light of EOP teaching and learning strategies aimed at the improvement of the professional discourse in the environment of Chinese and Ukrainian maritime college and university studies.

**Keywords:** Science and technology terminology, terminology analysis, cluster analysis, morphological analysis, semantic analysis, cognitive analysis, classification scheme.

## INTRODUCTION

The article is aimed at summarizing and describing the results of the first stages of the Pilot Project adopted at the ZIMC (Weiping and Chernytskiy, 2017), as well as investigating alternative approaches application for the forthcoming upgrading ESP teachers' and students' competences in the process of vocational training. The utmost attention has been paid to the assessment of the current state of teaching and learning English, analysis of teaching material selection, namely, the sources for compiling lexical minimum vocabularies of disciplines, and working out the technique of elaborating glossaries for separate sections (topics) of the subjects taught.

## METHODOLOGY

The description of methodological basis was preceded by an analysis of the emergence and development of new ideas in English teaching and study (Weiping *et al*., 2016). This systemic description was caused by the existing confusion among multiple names given to such approaches, due to their variety, similarity or, sometimes, almost complete identity. As is known, these diversified acronyms formed as initial abbreviations denominating certain techniques, emerged recently within the period of two decades after the publication of the well-known pioneering work by Waters and Hutchinson dealing with teaching English as a foreign language for professional needs (EOP) and specific purposes (ESP) (Hutchinson and Waters, 1987). It followed by avalanche projects professing various techniques and, sometimes, even declaring unique approaches. But they were essentially the development of the same idea articulated by the above-indicated authors, though specializing in detailed occupational needs

and aiming at a more specific target groups.

Moreover, a rather fruitful approach has been demonstrated by the proponents of content and language integrated learning (CLIL) which is directly connected with our technique of vocational teaching in line with Sino-Ukrainian Joint Program of the Zhejiang International Maritime College and the National University of Shipbuilding. The guidelines of its practical application are described in Chernytskiy and Movchan (2014), and excessive training exercises are referred to in Chernytskiy *et al*. (2014). Methodological peculiarities are presented in Montero–Martinez and Faber–Bentiez, (2009).

Being focused on the EOP technique as a central one in achieving desired results based on specific language competences in mastering profession, we also have to rely on general English teaching materials for lower level students as well as applying CLIL elements for encouraging further development of English communication skills in the professional environment of more successful learners. It looks like it is almost the only way to overcome dissimilarity of students' initial language competence levels. We are aware of one more effective resource of bridging these natural selection gaps, which lies in the reasonable combination of ESP didactic approach to teaching and arrangement of self-paced learning. But this is a topic of another study.

Here we have to make a brief digression in what follows, i.e. selection of lexical and terminological material for EOP learning. The principal sources of our search were traditional in ESP methodology, that is, the use of authentic materials. They comprise articles from specialized journals on shipbuilding, numerous specifications for ships construction and operation (hull elements, marine power plants, ship's gears, onboard mechanisms), terminological standards in shipbuilding and ship repair, various manuals, instructions and dictionaries.

## RESULTS AND DISCUSSION

Even superfluous analysis of the current state of shipbuilding technology results in the fact that the majority of newly-verbalized notions and ideas is observed in such innovative fields as ship's equipment of supply vessels and maintenance of off-shore rigs, in naval ship construction and diversification of new types of vessels, engaged in transportation of cargoes. Explication of notions is found to be the most efficient means of meaning transfer of these terms from one language to another. And this approach requires more elaborative efforts towards investigation of creating projective lexis for the notions and terms that still remain non-verbalized in Chinese, Ukrainian and other languages.

### Classification of terminology

As is known, elaboration of terminology model of any branch or field of engineering and technology anticipates sequential steps of terminological system analysis, namely the set of notions that is used both in shipbuilding on the whole and in its separate fields. This technique of goal-oriented linguistic and logical semantic analysis allows us to employ the advantages of economical selection of the terminological kernel. The latter restrains, in its turn, the term list excrescence due to the temptation to include a great number of terms into it, that are not directly connected with shipbuilding and marine power plants construction. On the basis of the authors' personal experience of compiling a number of e-dictionaries, minimum-vocabularies and glossaries to individual topics in ocean engineering, small craft vehicles, ship's gears, hull structure, marine power plants, welding technology, we can say that a terminology compiler has to keep in mind the fact that many nominations (notions, objects, names of processes) of the above-indicated area are not derived from the terminological system in question. On the other hand, we know that some of the terms belonging to the vocabulary of basic science are extensively used as instruments in shipbuilding theory and practice. Moreover, some of them were borrowed from other fields of knowledge but were eventually transformed into an inseparable part of the terminological system. Herewith the working procedure of terminology analysis in the field of "Marine Power Plant" (MPP) vocabulary is demonstrated. The terminological system under analysis (as well as any other) can be logically decomposed into the groups shown in Table 1.

We have deliberately presented the examples from different groups to demonstrate, that the enumeration of groups from the first to the seventh ones reflects certain hierarchy, and the number increment, that is the growth of group number, means the loosening of bonds with the terminological kernel of the field.

### Systemic character analysis

The procedure of systemic character analysis of terminology of any branch of science, technology or industry can be vividly demonstrated on the example of the study of word cluster formation in a dictionary. Within the frames of MPP terminological system, 26 cluster forming dominant terms have been found and around 340 terms were grouped around them. Let us consider cluster structure of the term 'engine'. Naturally, the dominant term comprises word combinations formed on its basis.

The word list of the "engine" family was compiled and presented below as a 'scrap view' in the alphabetical order on the basis of the analysis of general polytechnical dictionaries, authentic operation manuals, text-books, etc:

- aft engine
- auxiliary engine
- compression ignition engine
- coupled engine

**Table 1.** Principal term distribution into groups.

| No | Group name | Examples |
|---|---|---|
| 1 | Principal terms or dominating terms that form the kernel of the system and represent the key notions of the field | Engine, pump, valve, boiler, burner, rod, piston |
| 2 | Derivated terms that form generic and subordinate concepts of the system | Cooler, plunger, firebox, coiled pipe, de-aerator, crosshead |
| 3 | Compound terms as a sum of at least two principal or derived terms | Upper blow-down valve, water-tube boiler, steam exhaust pipe |
| 4 | Basic machine-construction terms | Tube, filter, pipe, cylinder, lever, disk, block, nozzle |
| 5 | Terms borrowed from other fields of technology that have transformed into inseparable part of the given terminological system | Enclosed journal, key, cylindrical bed, separator, atomizer, diaphragm, flange, bedplate |
| 6 | General scientific and technical terms | Reactor, regenerator, expansion, steam pressure, condenser, crank, receiver, shaft |
| 7 | Terms of wider semantics (lexical units that are used in many terminological systems, however they change its meaning depending on particular terminological system in contrast to general scientific and technical terminology) | Cage – 1) MPP- casing as distinct from 2) cage for animals, 3) cabin in elevator, etc. , or guide – 1) MPP- guide piece as distinct from 2) Geology – conductor, 3) Mining technology - pipe casing, pipe liner, or header- 1) MPP - drum head of the boiler in contrast to 2) punch on the head (boxing), play with the head (soccer), 3) trampoline jumping into the water with head getting into the water, 4) Mining - tunnel shield, etc. |

- cross-head engine
- diesel engine
- double-acting engine
- electrical ignition engine
- emergency engine
- external mixing engine
- trunk engine
- two-stroke engine
- vertical engine
- V-type engine

Even this superfluous search has resulted in over 40 term slot cluster that belongs to the MPP terminological subsystem.

The next step is syntactic and structural analyses of the terms. The size of this subsystem amounts over 340 units that allows assigning it to a mesonic terminological system. In order to calculate the average number of lexical units in the terminological system 'Marine Power Plants' we can make use of the following formulae:

$$\frac{(1 \times N1) + (2 \times N2) + (m \times Nm)\ldots..}{N},$$

where N stands for the total number of terms, and Nm is the number of m-component of terms. Thus, the calculations demonstrated that the average value of MPP term is composed of 2.11 lexical units in the range of one to four-unit word clusters. This approach does not look very much convincing for the elaboration of industry branch dictionary. But this is a superficial judgment. Statistics becomes of utmost importance for us in the process of selecting the terminological list of words and word combinations. Furthermore, the study of the cases of significant deviations from the obtained average value is another powerful instrument allowing to efficiently restrict terminological kernel and toss aside the words that are not relevant to the terminological system. Or, rather, if not connected with it firmly enough, they can be neglected.

The study of the structural composition of terms (the relationship among one-word, two-word and multi-word terms) resulted in 59 one-word terms, 128 two-word terms, 96 three-word terms and 27 multi-word terms. Two-word terms formed by the model N+N or A+N prevail (53%), for example: *steam space, air guide, drain pipe, evaporation surface; centrifugal pump, reversible engine, effective power, main frame*. About 9% of terms are formed by the model – V-ing+N: *heating surface, starting valve, reversing shaft*. The second place by frequency is occupied by one-word terms (24.3%). Among them are simple (*furnace, washer, tube),* as well as derived and composed terms (*crosshead, crankshaft, bedplate)*; the

third place is taken by three-word terms (18,7%): *tubular air heater, return tube boiler, fuel oil burner*. Multi-word terms are represented by merely 4%: *flanges of the front end plate, slide-valve triple expansion steam engines, free-piston gas generator*.

***Morphological analysis***

- ***suffixation*** word-building (formation of new one-word terms by means of adding suffixes to the words with roots borrowed from Greek and Latin). The terms formed in this way constitute 15.2% (91 units) in MPP field:

1) – er/or: *burner, economizer, superheater, header, centrifugal governor*
2) – ing: *hoisting, thrust bearing, valve-type uniflow scavenging, heating surface*
3) – tion/sion: *reaction turbines, nozzle partition plate, expansion*
4) – ness*: uniform thickness disc profile*
5) – ance/ence: *resistance, radial clearance*

-***prefixation*** word-building (formation of new terms by means of adding prefixes to the word roots) only constitutes 9.8% (58 units). Each prefix can have its own meaning, for instance:

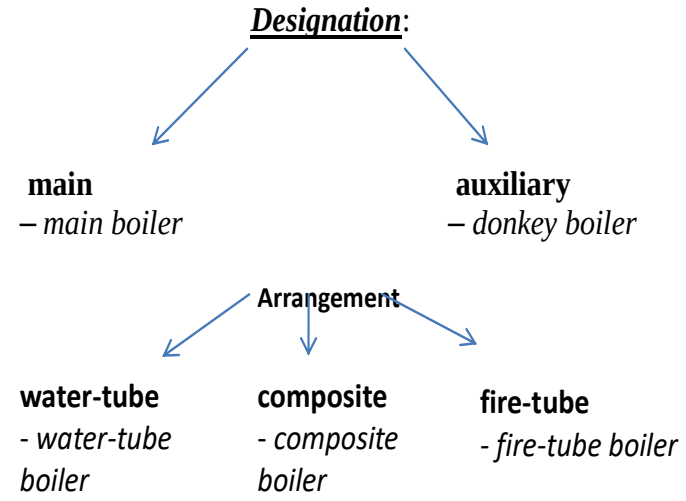
1) de – (relays the idea of elimination): *deaerator – device that eliminates all possible gases from water*
2) un- and non- (meaning "non"): *undivided chamber, nonreversible engine*
3) re - (meaning "backwards", "once again"): *reducing valve – a device that automatically by-passes liquid or gas from the volume of high pressure into the volume of lower pressure;*
4) ex- (meaning "away from", "behind the borders"): *exhaust valve;*
5) com - *(meaning "together")*: *a compressor is a machine for compression of air or other gas for overcharged pressure.*

**Cognitive analysis of terminological system**

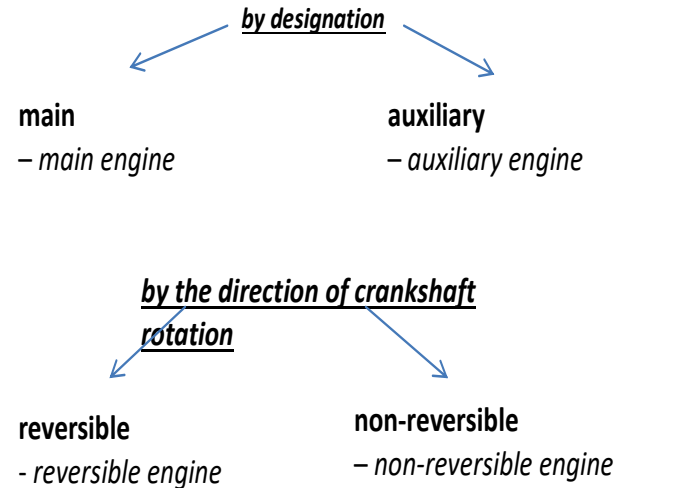
Compilers of terminological word lists, glossaries or vocabularies for EOP students are to take into account the fact that the linguistic sequential analysis of branch terminology demonstrated above allows to eliminate inaccuracy in the process of term equivalent selection. But there is a couple of additional techniques to help the ESP teacher while working with the authentic materials.

The first deals with the explication of the term. For instance, in the pair "cutwater – breakwater" the first will be referred to the ship provided it has explication "in the bow of the vessel". Without it "breakwater" will be precise if a hydrotechnical structure is concerned.

The second observation touches upon the application of cognitive analysis of terminological system which represents a complex structured entity. And classification analysis is an excellent instrument for defining basic concepts of the branch terminology. Here we mean that in compliance with the principal statement of cognitive linguistics the concepts are not verbalized in the result of a mere coincidence of circumstances, but on the basis of an idea, and insight about them that have been formed in the process of practical activity of people. And the more classification types we apply, the more accurate our terminology system will be. Let's refer to the examples. The most simple and common patterns of classification used in manuals, reference books and profession-oriented training adjuncts are the so-called mind maps, master charts, generic and type classes trees, frames, etc. Here is a typical example of a master chart describing various types of marine power plant (Figure 1).




Marine engines can be classed in line with the following features:




There are also engines of right-hand and left-hand rotation.

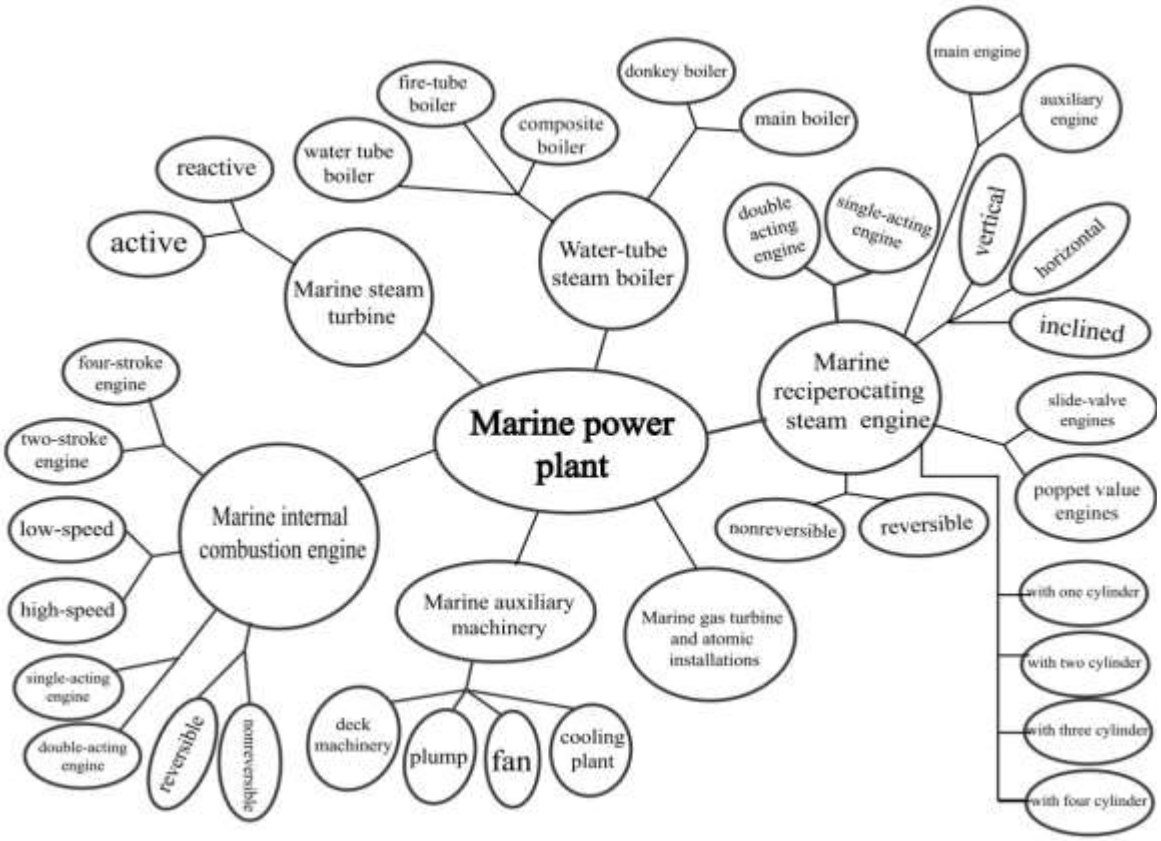



**Figure 1.** AWS master chart of marine power plant.

***by the type of working cycle***

**four-stroke**
*– four-stroke engine*

**two-stroke**
*- two-stroke engine*

***by way of charging the cylinder***

**without charging**
*- naturally aspirated engine*

**with charging**
*- supercharged*

***by the number of cylinder working cavities***

**single-acting**
*- single-acting engine*

**double-acting**
*- double-acting engine*

***Explication:*** working cycle of a single-acting engine is performed in a single upper cavity of a cylinder, whereas working cycle of a double-acting engine is performed in both cylinder cavities. Most of marine engines are single-acting ones.

***by way of mixture formation***

**internal mixture forming (diesel engines)**
*- internal mixing*

**external mixture (carburetor engines)**
*- external mixing*

***Explication***: working mixture of internal mixing engines is formed inside the working cylinder. The engines where working mixture is prepared outside the cylinder (carburetor engines and gas ones) are called engines with external mixture forming.

***by way of working mixture ignition***

**with self-ignition due to compression**
*- compressing engine*

**ignition by electric spark**
*- electrical engine*

***by structural arrangement of a crank gear***

**with trunk**
*- trunk engine*

**with cross-head**
*– crosshead engine*

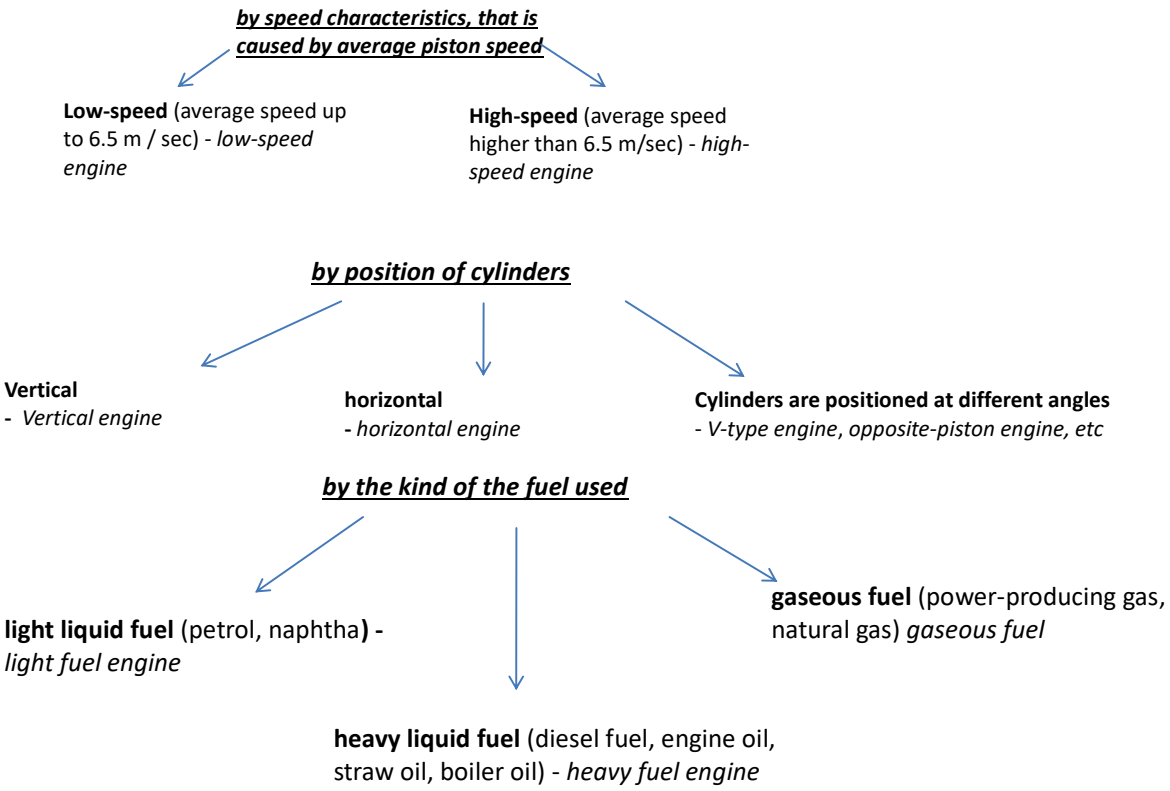



**Figure 2.** Types of classification used for term selection.

***Explication:*** in trunk engines the pistons are directly connected with rods. In cross-head engines the piston is secured to the connecting rod through the stock and cross-head.

Most schemes usually represent the main classified notions required for systemic presentation of a subject, discipline as a whole, as well as their constituting components or products. They are arranged on various bases of relationships, such as subordination, adjacency, homogeneity, similarity, origin, functions, etc. From the linguistic point of view they are principally nouns reflecting different relations among the nominated elements or components of a system. It can be illustrated by systematizing the above-indicated Marine Power Plant terminology by various features, functions, types of arrangement (Figure 2). Thus, boilers, as principal components of an MPP could be classed (Figure 2).

Selection of terms in this way for ESP lexical materials is highly precise and comprehensive but not sufficient for communication in a specific environment. Again, from the linguistic viewpoint, the communicant should be "equipped" not only with declarative competences (knowledge of object names, processes, materials, etc), but be also able to describe various qualities, describing the form (round, oval, protruded), shape (dog-bone pertaining to a piece), bath-tub (of a curve), herring-bone (of a gear type), degree of surface finish (rough, smooth), physical state properties (elastic, plastic), hardness. These properties are verbalized with the help of adjectives. And more like important than aforementioned are procedural or processual competences (expressed by verbs), that ensure the speaker's ability to describe the actions, processes, interactions among the objects or their parts. And there are also other (morphological) class words without which ESP competences of the end-user would be incomplete and ineffective.

## CONCLUSION

And here an essential question arises: where and how can an ESP teacher obtain them without relying on his own language intuition and discipline competence (which is insufficient, as a rule)? The answer can be partly found in the ideas of one of the latest ESP authority (Wright, 2013), who advises reducing the risk of choosing the wrong word and finding the right one by arranging the communicative situations among the experts of the discipline in the process of ESP teaching and learning. But this is not actually our situation where the college students have no essential expertise of 'specific situation' in their mother tongue. If the task concerns enormous lexical materials embracing several interconnected disciplines, such as ship's hull structure, ship's gears and mechanisms or marine power plants, we can refer to the

latest results of research in computer-aided analysis of texts or natural speech, for example, Wood's transition networks (Woods, 1970) and those developed by corpora linguistics proponents (all the latest dictionaries, including Word Power types, are based on verifications of millions of examples and their frequency occurrence in speech). International standards of terms and their definitions could be a great help in the lexicographic search for ESP teachers (Chernytskiy *et al*., 1984). It should be pointed out that periodical digests of terms and definitions are, generally, extremely powerful and reliable source of terminological systems replenishment and formation.

The principal statements of the article demonstrate, that in the course of our argumentation concerning vast and much disputable area of material selection for ESP technology of teaching, we have pointed out the approaches and procedure of the entire work aimed at selection of terminology. Its compact and customary presentation depends on the amount of material to be acquired, ranking from a dictionary, through a vocabulary, a glossary and finally a word list for a separate subject of a course discipline to a single lesson. Case presentation has been made on the basis of shipbuilding technology and, namely, MPP area designated for maritime college students.

**REFERENCES**

**Chernytskiy VB, Gal AT, Ishchenko VV (2014).** Manual for reading scientific and specialized literature in English for post-graduate students. Nykolaev, NUS, p. 70.

**Chernytskiy VB, Gryaznoukhina TA, Verbutskiy VL (1984).** Automation of Scientific Text Analysis. Kiev, "Naukova dumka".

**Chernytskiy VB, Zhang X (2014)** Acquisition of technical vocabulary and shipbuilding terminology in Chinese didactic environment. In: NUS Humanitarian herald, 7:60-65.

**Chernytskiy VB, Movchan LS (2014).** ESP for Chinese Students of Maritime Colleges and Universities (based on NUS teachers' experience). In: Proceedings of 5th International science and technology conference "Innovations in Shipbuilding".- Mykolayiv: NUS: pp. 531-534.

**Hutchinson T, Waters A** (1987) A. English for specific purposes: A learning-centered approach. Cambridge: Cambridge University Press, p.181.

**Montero-Martinez S, Faber-Bentiez P (2009).** Terminological competence in translation. J. Terminol. (1):88-104 .

**Moutford A (1981).** The what, the why and the way, in Aupelf/Goethe Institute/British Council, English for Specific Purposes, Montreal: Aupelf.

**Terminological Work.** Glossary of Terms. Part 1. Theory and usage (ISO 1087-1:2000, IDT).

**Woods WA (1970).** Transition Networks Grammars for Natural Languages Analysis, Communications of the ACM, 13(10):591-606.

**Wright R (2013).** How to Write ESP Materials (Training Course for ELT Writers, Book 3). ELT Teacher 2 Writer, p. 67.